

Claims

What is claimed is:

1. A method, comprising:

5 providing an optical imaging module to project a patterned radiation beam to a photoresist layer during a lithographic process; and

filling an immersion liquid comprising a polymer or oligomer between an output surface of the optical imaging module  
10 and the photoresist layer to transmit the patterned radiation beam from the optical imaging module to the photoresist layer.

2. The method as in claim 1, wherein the immersion liquid further comprises silicon.

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3. The method as in claim 1, wherein the immersion liquid comprises  $[-\text{Si}(\text{CH}_3)_2\text{-O-Si}(\text{CH}_3)_2\text{-O-}]_x$ , where  $x$  is a positive integer number.

20 4. The method as in claim 1, wherein the immersion liquid comprises  $[-\text{Si}(\text{CH}_3)_2\text{-O-Si}(\text{CH}_3)_2\text{-O-}]_x\text{-Poly}(\text{tButoxyl Acrylate})_y$  where  $y$  is between 3 and 5.

5. The method as in claim 1, wherein the immersion liquid exhibits a lubricating property.

6. The method as in claim 1, wherein the immersion liquid  
5 is hydrophobic.

7. The method as in claim 1, wherein the immersion liquid does not interact with the photoresist layer.

10 8. A material for an immersion liquid of an immersion photolithographic system, comprising a polymer which comprises silicon.

9. The material as in claim 8, wherein the polymer  
15 comprises silicon.

10. The material as in claim 8, wherein the polymer comprises  $[-\text{Si}(\text{CH}_3)_2\text{-O-Si}(\text{CH}_3)_2\text{-O-}]_x$ , where x is a positive integer number.

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11. The material as in claim 8, wherein the polymer comprises  $[-\text{Si}(\text{CH}_3)_2\text{-O-Si}(\text{CH}_3)_2\text{-O-}]_x\text{-Poly}(\text{tButoxyl Acrylate})_y$  where x and y are integers.

12. The material as in claim 1, wherein the polymer exhibits a lubricating property.

5        13. The material as in claim 8, wherein the polymer is hydrophobic.

14. The material as in claim 1, wherein the polymer does not interact with the photoresist layer.

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15. A system, comprising:  
an optical illumination module to project an illumination beam;

a mask located in a path of the illumination beam and  
15 having an optical pattern to superimpose the optical pattern on the illumination beam;

an optical imaging module located to receive the patterned illumination beam and to focus the patterned illumination beam to a imaging plane;

20        a wafer stage to hold a wafer at the imaging plane; and

an immersion liquid comprising a polymer and filled between the wafer and the optical imaging module to transmit the patterned illumination beam to the wafer.

16. The system as in claim 15, wherein the polymer comprises silicon.

5        17. The system as in claim 15, wherein the polymer comprises  $[-\text{Si}(\text{CH}_3)_2\text{-O-Si}(\text{CH}_3)_2\text{-O-}]_x$ , where x is a positive integer number.

18. The system as in claim 15, wherein the polymer  
10 comprises  $[-\text{Si}(\text{CH}_3)_2\text{-O-Si}(\text{CH}_3)_2\text{-O-}]_x\text{-Poly}(\text{tButoxyl Acrylate})_y$  where x and y are integers.

19. An immersion liquid for an immersion photolithography system, comprising:  
15        water; and  
         an additive added to the water and comprising a surfactant.

20. The liquid as in claim 19, wherein the surfactant comprises a moiety that has carbon or silicon.

20        21. An immersion liquid for an immersion photolithography system, comprising:  
         water; and

an additive added to the water and comprising a photo acid generator.

22. The liquid as in claim 21, wherein the photo acid  
5 generator comprises an aryl.

23. An immersion liquid for an immersion photolithography system, comprising:

water; and

10 an additive added to the water and comprising a base.

24. The liquid as in claim 23, wherein the base comprises alkyl.

15 25. An immersion liquid for an immersion photolithography system, comprising:

water; and

an additive added to the water and comprising a buffer.

20 26. The liquid as in claim 25, wherein the buffer comprises a mixture of a salt and an acid.

27. An immersion liquid for an immersion photolithography  
system, comprising:

water; and

an additive added to the water and comprising a salt.

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28. The liquid as in claim 27, wherein the salt is an  
ammonium salt.

29. An immersion liquid for an immersion photolithography  
10 system, comprising:

water; and

an additive added to the water and comprising a  
plasticizer.

15 30. The liquid as in claim 29, wherein the plasticizer  
comprises a moiety that comprises carbon or silicon.